REMARKS

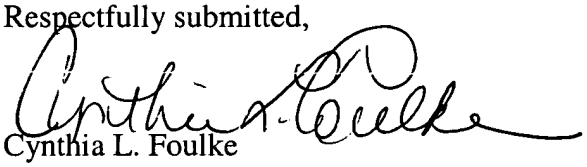
A marked-up copy of pages 2, 3 and 7 of the specification showing the changes made is attached.

A marked-up copy of the claims showing the changes made is also attached.

Applicants arguments set forth in the earlier filed responses to the Office action, paper No. 3, mailed August 20, 2001, are incorporated herein by reference.

Early action on the merits is in order and is requested.

Respectfully submitted,



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MARKED-up Copy of p. 2 of the Specification

SUMMARY OF THE INVENTION

We have now found hot-melt adhesives prepared from

a) about 5 to about 60 weight percent ethylene vinyl acetate having a vinyl acetate content of about 30 to about 50 weight percent and a melt index of about 700 to about 4,000 dg/min;

b) about 5 to about 60 weight percent of a tackifier; and

c) about 15 to about 55 weight percent wax with a melting point of about 125°F to about 180°F.

The hot-melt adhesive compositions of the present invention can be applied at temperatures of 200°F to 300°F yet still provide exceptional heat resistance despite using low molecular weight components which would conventionally be thought to produce poor heat and cold resistance.

Accordingly, the hot-melt adhesives of the present invention find use in case and carton sealing operations. Corrugated cases are often subjected to high stresses and adverse environmental conditions during shipping. The hot-melt adhesives of the present invention meet the rigorous requirements for this and other applications.

DETAILED DESCRIPTION OF THE INVENTION

The present invention is directed to hot-melt adhesive compositions which can be applied at temperatures between 200°F to 300°F yet still provide exceptional heat resistance and good cold adhesion despite using low molecular weight components.

The ethylene vinyl acetate copolymers (EVA) useful herein are those containing about 30 weight percent to about 50 weight percent vinyl acetate and having a melt index of about 700 dg/min to about 4,000 dg/min. The preferred copolymers are available from EXXON under the designation ~~Escorene~~ ESCORENE MV01040 and comprise approximately 40 weight percent vinyl acetate and have a melt index of about 1,000 dg/min. The amount of the copolymer present in the hot-melt adhesive varies from about 5 to 60 weight percent by weight, preferably about 35 to about 45 weight percent by weight.

MARKED-up Copy of page 3 of The Specification

Tackifiers useful in the present invention include terpene, terpene phenolic, modified terpene, and combinations thereof. Terpene phenolic tackifiers also include the hydrogenated derivatives of phenolic modified terpene resins, for example, as the resin product resulting from the condensation, in an acidic medium, of a bicyclic terpene and a phenol. ~~Nirez~~ NIREZ 2040, a phenolic modified terpene having a Ring and Ball softening point about 125°C and available from Arizona Chemicals, is the most preferred.

For use herein, it is also important that the tackifiers have a Ring and Ball softening point less than about 130°C, preferably about 125°C.

Tackifiers are utilized in amounts of about 5 weight percent to about 60 weight percent, by weight of the hot-melt adhesive composition. The present invention contemplates that the hot-melt adhesive composition of the present invention comprise one or more of the above tackifiers.

The compositions of this invention may optionally contain at least one additional tackifier selected from the group consisting of rosin, rosin derivatives, rosin ester, aliphatic hydrocarbons, aromatic hydrocarbons, aromatically modified aliphatic hydrocarbons and mixtures thereof. Examples of rosin ester tackifiers include both natural and modified rosins such as gum rosin, wood rosin, tall-oil rosin, distilled rosin, hydrogenated rosin, dimerized rosin, polymerized rosin, as well as the glycerol and pentaerythritol esters of natural and modified rosins, such as, for example, the glycerol ester of pale wood rosin, the glycerol ester of hydrogenated rosin, the glycerol ester of polymerized rosin, the pentaerythritol ester of hydrogenated rosin, the phenolic-modified pentaerythritol ester of rosin, and combinations thereof. Glycerol rosin ester is the most preferred rosin ester.

Representative additional tackifiers include NIREZ V-2040 and NIREZ 300 from Arizona Chemical Company, and DERTOPHENE T 105 from DRT. Other commercially available tackifiers include SYLVATAC 100, ZONATAC and ZONESTER from Arizona Chemical Company, PERMALYN from Hercules, UNITAC Union Camp and NOVARES from Georgia Pacific.

Waxes suitable for use in the present invention are paraffin waxes having melting points in the range of about 125 to 175°F, such as, for example, PACEMAKER

MARKED-up Copy of PAGE 7 of the Specification

from the front to the back of the jar the product was designated "Clear"; if it remained visible only until the thermometer was moved to the center of the jar it was designated "Moderately Hazy"; and if it was visible only at the front of the jar it was designated "Hazy".

These measures of clarity provide an indication of a hot melt's overall compatibility, i.e., the compatibility of the individual ingredients with each other. Products that are clear reflect an overall compatible product. Systems which are hazy at their application temperature exhibit a micro separation changing the refraction index of the molten adhesive.

The following materials were used to prepare a series of adhesives in accordance with the present invention: ~~Irganox~~ IRGANOX 1010 (available from Ciba Geigy); ~~Nirez~~ NIREZ 2040 (available from Arizona Chemical Co.); ~~Sylvatac~~ SYLVATAC 40N (available from Arizona Chemical Co.); ~~Unitac~~ UNITAC R100 (available from Union Camp); ~~Kristalex~~ KRISTALEX 3100 (available from Hercules Co.)

	Example 1	Example 2	Example 3	Example 4	Example 5
Irganox 1010	0.5	0.5	0.5	0.5	0.5
150°F SP Wax	30	—	—	—	10
40% VA / 1000MI EVA	35	60	70	90	50
Nirez 2040 125°C SP	35	40	30	10	40
Viscosity @ 275°F	1,400	26,950	29,250	34,200	9,675
Adhesion @ RT 40°F -30°F	Full Partial Full	NA NA NA	NA NA NA	NA NA NA	Slight Partial Partial
Kanebo Set Time W/1sec OT Partial Full FT	~ 1.7 sec. ~ 3.5 sec.	NA NA	NA NA	NA NA	~ 2.5 sec. ~ 4.5 sec.
Open Time w/ 10 sec ST	~ 3.0 sec.	NA	NA	NA	~ 6.0 sec.
Clarity	Clear	Clear	Clear	Clear	Clear
Open Time w/ 10 sec ST	~ 3.0 sec.	—	—	—	—

Marked-up copy of claims showing changes made

Claim 1 (amended). A hot melt adhesive composition comprising[:], by weight of the hot melt adhesive composition,

a) about 5 weight percent to about 60 weight percent of an ethylene vinyl acetate copolymer having a vinyl acetate content of about 30 weight percent to 50 weight percent and a melt index of about 700 to 4,000 dg/min;

b) about 5 weight percent to about 60 weight percent of a tackifier; and

c) about 15 weight percent to about 55 weight percent of a wax with a melting point of about 125°F to 180°F;

wherein the hot melt composition can be applied at a temperature of 200°F to 300°F.

Claim 6 (amended). An adhesive according to Claim 1 wherein the wax is paraffin wax or [low melting point] synthetic wax.

Claim 8 (amended). A hot melt [An] adhesive composition comprising[:], by weight of the hot melt adhesive composition,

a) about 35 weight percent of an ethylene vinyl acetate copolymer with about 40 weight percent vinyl acetate and having a melt index of at about 1,000;

b) about 30 weight percent of a tackifier selected from the group consisting of terpene, terpene phenolic, modified terpenes, and combinations thereof;

c) about 5 weight percent of at least one additional tackifier selected from the group consisting of [hydrogenated glycerol,] pentaerythritol, hydrogenated glycerol, and combinations thereof;

d) about 30 weight percent of a wax with a melting point of about 150°F;

wherein the hot melt composition can be applied at a temperature of 200°F to 300°F.

Claim 10 (new). An adhesive according to Claim 3 which comprises a terpene phenolic tackifier.

Claim 11 (new). An adhesive according to Claim 1 which comprises about 35 weight percent to about 45 weight percent of an ethylene vinyl acetate copolymer.

Claim 12 (new). A method of bonding substrates together, said method comprising applying, at an application temperature of 200°F to 300°F, the hot melt adhesive composition of claim 1 to a first substrate, bringing a second substrate in contact with the composition applied to the first substrate, whereby the first substrate becomes bonded to the second substrate.